Two pigs/replicate were randomly selected and bled at the first and last weeks of the trial to determine the serum total proteins, albumin, globulin, creatinine, urea, cholesterol, and glucose. All statistical data were subjected to ANOVA, and, where statistical significance were observed, the means were compared using the Duncan's multiple range test (SAS). The results indicated that the increasing levels of MO resulted in increased levels of crude fibre (5.83, 6.57, 6.83, 7.05, 7.27, and 7.38%) and decreased levels of predicted metabolizable energy (ME) contents of the diets (3531.01, 3459.51, 3447.60, 3416.08, 3410.05, and 3372.47 Kcal ME/kg), while the dry matter intake (0.85, 0.84, 0.80, 0.82, 0.87, and 0.85 kg) was not ($P > 0.05$) affected for the 0, 25, 30, 35, 40, and 45% MO levels, respectively. The diets and the constituent nutrients were efficiently utilized in terms of G:F (0.56, 0.54, 0.58, 0.54, 0.56, and 0.54), ME intake per gain (6361.82, 6277.67, 5991.78, 6382.28, 6067.30, and 6199.02 Kcal ME) to support comparable ($P > 0.05$) gains (0.47, 0.49, 0.48, 0.47, 0.51, and 0.48 kg), though slight variations were observed with the ME intake. The performance of pigs fed up to 45% MO replacement of maize were comparable ($P > 0.05$) to those fed the maize-based control diet.

Key Words: maize offal, weaned pigs, non-conventional feedstuff

0757 The effects of standardized ileal digestible lysine level with or without tribasic copper chloride on growth performance, carcass characteristics, and fat quality in finishing pigs. K. F. Coble*[1], S. S. Dritz[1], J. L. Usry[2], J. E. Nemechek[1], M. D. Tokach[1], J. M. DeRouchey[1], R. D. Goodband[1], J. C. Woodworth[1], and G. M. Hill[3], *[1]Kansas State University, Manhattan, [2]Micronutrients, Social Circle, GA, [3]Michigan State University, East Lansing.*

A total of 1248 pigs (initially 28.9 kg BW) were used in a 120-d study to determine the effects of added tribasic copper chloride (TBCC; IntelliBond C; Micronutrients, Indianapolis, IN) and increasing standardized ileal digestible Lys on growth performance, carcass characteristics, liver Cu concentration, and carcass fat quality in finishing pigs. Pens of pigs were allotted to one of six dietary treatments, balanced on average pen weight in a randomized complete block design with 26 pigs per pen and eight replications per treatment. Treatments were arranged in a 3 × 2 factorial with main effects of SID Lys (85, 92.5, and 100% of the estimated requirement) and added Cu (0 or 150 ppm) from TBCC. All diets were corn-soybean meal-based with 30% distiller's dried grains with solubles, 15% bakery meal and 17 ppm Cu from $CuSO_4$ provided from the trace mineral premix. There were no TBCC × SID Lys interactions observed for growth performance or liver Cu concentrations. Increasing SID Lys increased ($P < 0.01$) ADG, G:F and final BW (Table 0757). Pigs fed 150 ppm TBCC tended ($P < 0.10$) to have increased ADG, G:F and final BW. Liver Cu concentrations were greater ($P < 0.01$) in pigs fed TBCC and tended to decrease (quadratic; $P < 0.09$) as SID Lys increased. In pigs fed TBCC, jowl fat iodine value (IV) calculated from the fatty acid analysis of all three fat layers, increased with increasing SID Lys but not in pigs fed diets without TBCC (Lys × TBCC interaction; $P < 0.03$). In summary, SID Lys did not influence the response to TBCC is this experiment.

Key Words: finishing pig, copper, lysine, iodine value

0758 Effects of hard red winter wheat particle size on finishing pig growth performance and caloric efficiency. J. A. De Jong*, J. M. DeRouchey, M. D. Tokach, R. D. Goodband, and S. S. Dritz, *Kansas State University, Manhattan.*

A total of 288 pigs (43.8 kg BW) were used in an 83-d trial to determine the effects of hard red winter wheat particle size on finishing pig growth performance and caloric efficiency. Caloric efficiency (CE) was calculated using the ingredient energy values from NRC (2012) ME and INRA (2004) NE. Pigs were allotted to one of three dietary treatments with six pens/treatment and eight pigs/pen. The same wheat–soybean meal-based diets were used for all treatments. Diets were fed in mash form. The three dietary treatments included hammer-mill ground wheat to particle sizes of) 728, 579, and 326 µm, respectively. From d 0 to 40, decreasing wheat particle size decreased (linear; $P < 0.03$) ADFI (2.29, 2.24, 2.20 kg), but improved (quadratic; $P < 0.01$) G:F (0.400, 0.413, 0.409) and

Table 0757. Dietary SID Lys level with or without tribasic copper chloride in finishing pigs

	TBCC, ppm						Probability, $P <$ [1]		
	0			150				SID Lys	
SID Lys, %	85.0	92.5	100.0	85.0	92.5	100.0	TBCC	Linear	Quadratic
d 120 BW, kg	122.8	125.4	126.2	123.7	125.8	129.0	0.07	0.01	0.76
ADG, kg	0.80	0.81	0.82	0.80	0.82	0.84	0.10	0.01	0.74
ADFI, kg	2.18	2.20	2.19	2.19	2.19	2.23	0.65	0.23	0.95
G:F	0.365	0.370	0.373	0.365	0.374	0.380	0.09	0.01	0.58
Liver Cu, ppm	13	13	12	33	33	26	0.01	0.18	0.09
Jowl IV[2]	84.2	84.6	83.6	82.7	83.6	85.5	0.74	0.16	0.87

[1]SEM were 1.52, 0.007, 0.032, 0.004, 3.3, and 0.801 for d 120 BW, ADG, ADFI, G:F, liver Cu, and jowl IV, respectively.
[2]Linear TBCC × Lys interaction ($P < 0.03$).

CE (7.89, 7.65, 7.72 Mcal ME/kg) and (5.84, 5.66, 5.71 Mcal NE/kg) basis, with no change ($P > 0.24$) in ADG (0.92, 0.93, 0.90 kg/d). From d 40 to 83, decreasing wheat particle size increased (quadratic; $P < 0.01$) ADG (0.92, 0.90, 0.95 kg/d), and improved (linear; $P < 0.01$) G:F (0.319, 0.322, 0.336) and CE (9.92, 9.83, 9.44 Mcal ME/kg and 7.45, 7.38, 7.08 Mcal NE/kg), with no change ($P > 0.23$) in ADFI (2.87, 2.80, 2.84). Overall from d 0 to 83, reducing wheat particle size improved (linear; $P < 0.01$) G:F and CE on both an ME and NE basis, with no difference in ADG or ADFI. Fine grinding wheat was detrimental to feed intake in early finishing but improved ADG in late finishing and G:F for both periods and overall.

Key Words: finishing pig, particle size, wheat

Table 0758. Effects of hard red winter wheat particle size on finishing pig growth performance and caloric efficiency

	Wheat particle size, µm				Probability $P <$	
d 0 to 83,	728	579	326	SEM	Linear	Quadratic
ADG, kg	0.92	0.91	0.93	0.01	0.47	0.50
ADFI, kg	2.59	2.53	2.53	0.03	0.13	0.43
G:F	0.354	0.361	0.367	0.002	0.01	0.82
Caloric efficiency, Mcal/kg gain						
ME	8.94	8.76	8.62	0.06	0.01	0.75
NE	6.67	6.53	6.43	0.05	0.01	0.75

0759 The effects of dietary zinc oxide and chlortetracycline on nursery pig growth performance.

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A total of 240 weaned pigs (PIC 1050; initially 6.08 ± 0.60 kg) were used in a 47-d study to compare the effects of added Zn from ZnO, alone or in combination with a low or high dose of chlortetracycline (CTC) on nursery pig growth performance. Pigs were allotted to pens at weaning (d 0) and fed a common starter diet with no antimicrobial for 5 d before the start of the experiment. On d 5, pens of five pigs were allotted to one of six dietary treatments, balanced on average pen weight in a randomized complete block design with eight replications per treatment. Dietary treatments were arranged in a 2 × 3 factorial with main effects of added ZnO (0 vs. 2500 ppm of Zn) and CTC (0, 55, or 441 mg/kg feed). Pigs were fed experimental diets from d 5 to 26 after weaning followed by a common corn-soybean meal-based diet without antimicrobial from d 26 to 47. Pigs on the 55 mg/kg treatment received CTC continuously from d 5 to 26; however, to comply with FDA guidelines, CTC was removed from the diets of pigs fed 441 mg/kg CTC on d 15, then added again from d 16 to 26. All diets contained at least 110 ppm of Zn from ZnO in the trace mineral premix. No ZnO × CTC interactions were observed. Pigs fed added ZnO had increased ($P = 0.001$) ADG, ADFI, and BW during the treatment period but decreased G:F ($P = 0.025$) from d 26 to 47 when a common diet was fed. Overall (d 5 to 47), pigs fed added ZnO had increased ($P < 0.05$) ADG and ADFI. Pigs fed CTC had increased (linear, $P < 0.05$) ADG, ADFI, and BW during the treatment period. Overall, pigs fed CTC tended to have increased (linear, $P < 0.10$) ADG and ADFI, but G:F tended (quadratic, $P = 0.070$) to increase then decrease as CTC increased. In summary, ZnO and CTC increased ADG and ADFI but had a minimal effect on feed efficiency.

Key Words: nursery pig, zinc, chlortetracycline

Table 0759. Effect of zinc oxide and chlortetracycline on pig growth

Added Zn, ppm	0	0	0	2500	2500	2500	
CTC, mg/kg	0	55	441	0	55	441	SEM
d 5 to 26							
ADG, g	355	378	386	397	397	417	7.9
ADFI, g	504	514	528	549	542	570	11.9
G:F	0.705	0.737	0.731	0.725	0.734	0.732	0.0128

0760 Efficacy of Biomin BBSH 797 to biotransform deoxynivalenol to the metabolite de-epoxy-deoxynivalenol in serum of pigs.

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The mycotoxin deoxynivalenol (DON) and its metabolites are important biomarkers to demonstrate the efficacy of DON deactivating products in vivo. The aim of this study was to prove the capability of Biomin BBSH 797 to detoxify DON to the metabolite de-epoxy-deoxynivalenol (DOM-1) in the gastrointestinal tract of pigs. Therefore, DON and DOM-1 were measured in the serum of pigs. A total of 124 weaned piglets (mixed sex, approx. 28 d) were adapted for 2 wk. After adaption, 24 animals were randomly assigned to three experimental groups, according to weight, gender and overall condition. Control group received no DON and no BBSH 797. The second group only received 2 µg/kg of naturally DON contaminated wheat and the third group received two µg/kg DON and 1.7 × 10^8 cfu BBSH 797/kg feed. During the experimental phase, piglets were fed restrictively twice a day. Serum samples of all animals in all groups were taken on four consecutive days. Sample 1 (blank serum sample) was taken before feeding the experimental diets. All other serum samples were taken 1.5, 4, 10, and 24 h after feeding the experimental diets. Serum samples were analysed for DON and DOM-1 concentrations by LC/MS-MS method. There were no significant differences in blank serum samples between the three groups. Due to the presence of DON in the standard diet, small amounts of DON and DOM-1 produced by the native intestinal flora were also found in the blank samples. On d 3 of the trial, DON concentration 1.5 h after feeding was more than four times higher in serum of the DON group compared to the control and the DON+BBSH group ($P = 0.02$). DOM-1 concentrations in serum (d 3, 1.5 h) were